Measuring Foregone Taxes and Distributional Impacts of Use-Value Taxation Over Time in Hawaii

Hiroshi Yamauchi

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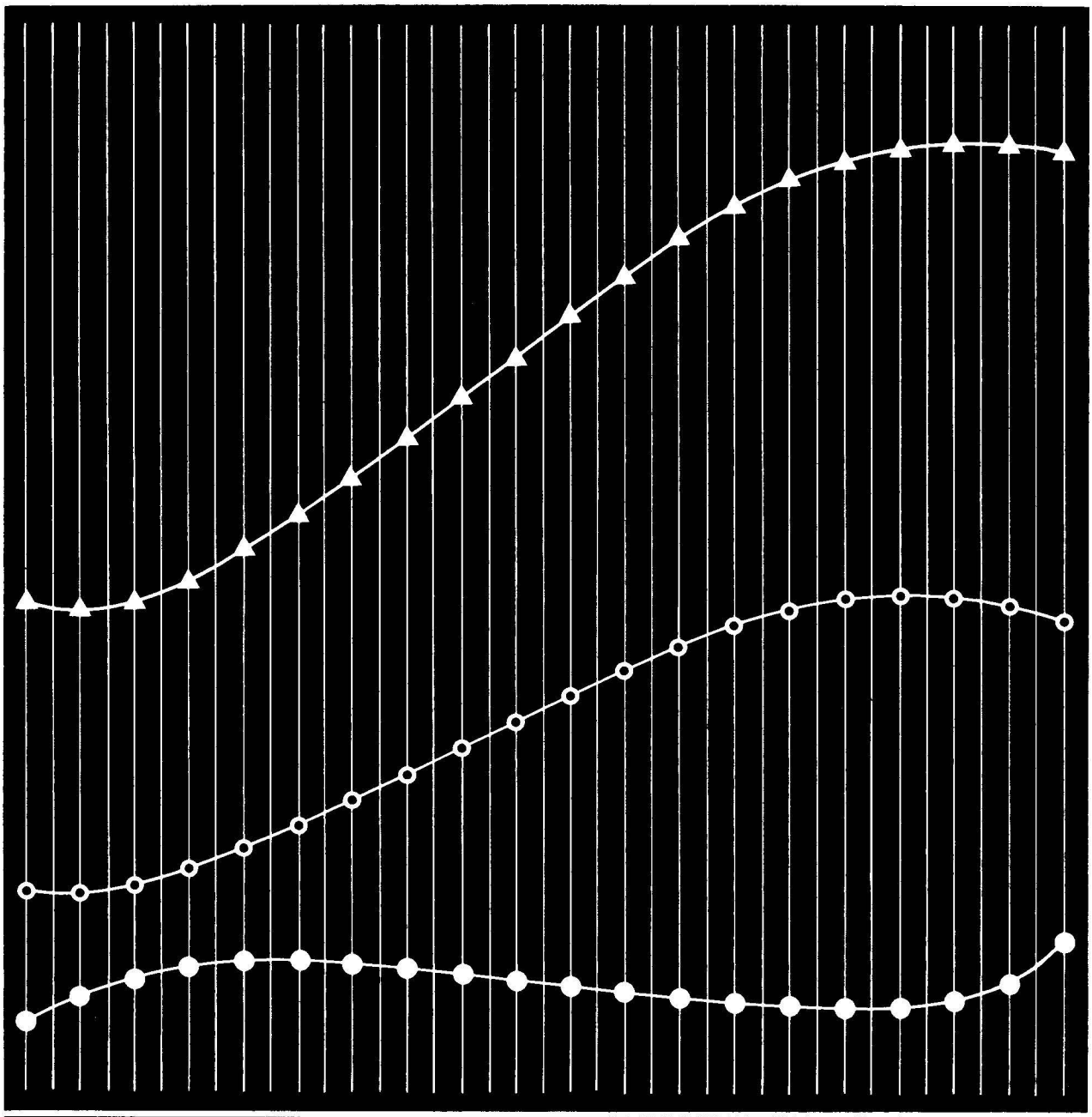

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MEASURING FOREGONE TAXES AND DISTRIBUTIONAL IMPACTS OF USE-VALUE TAXATION OVER TIME IN HAWAII

Hiroshi Yamauchi

ABSTRACT

In measuring the distributional impacts of use-value tax programs, it is necessary to compare effective tax rates with the program versus simulated tax rates without the program. The distributional impacts on local property tax bases in Hawaii have been relatively minor (less than 1.25 percent) over the first phase (1963-1973) of the program. This is true even if the foregone growth effects of reduced property tax bases are taken into account.

Measurements since 1973 are complicated by problems of data interpretation due to new shadow market valuation practices and also because the accumulated data thus far reflect a transition stage at best. Nevertheless, the following conclusions and implications for the long run can be drawn: (1) the relative impacts on local property tax bases are primarily determined (and limited) by the economic structures of each county; (2) agriculture shares in the burden of tax transfer effects, and this is more pronounced in the three rural counties of Hawaii, Maui, and Kauai than in the Standard Metropolitan Statistical Area of the City and County of Honolulu; (3) the effects of tourism, urbanization, and the capitalization of taxes will all tend to lessen the transfer effects over time in all counties even if the growth potentials of foregone tax bases are taken into account; and (4) contrary to the United States Council of Environmental Quality's recent national study on *Untaxing Open Space* (1976, *see* p. 117), there is still an important potential for realizing more of the land allocation function of use-value tax programs through policies that can strengthen the indirect incentive effects of recapture taxes. Such policies should, however, be formulated in close coordination with the direct controls of zoning in areas where strong and increasing competition for prime agricultural lands persists.

INTRODUCTION

The experiences with use-value taxation programs in most states of the United States have led to the general conclusion that the land allocational performance of these programs has not been impressive, and the distributive consequences are important. This is not surprising since taxes are primarily distributive devices and, at best, indirect tools for influencing land allocation (as opposed to the direct police power tools of zoning and regulations) with uncertain results. The trend toward use-value taxation of agricultural lands nevertheless continues to be an important component of land use policies to preserve agricultural lands and their joint product open space.[1]

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[1] *Untaxing Open Space*, 1976, reports: "Since 1957, when Maryland enacted the first statute authorizing differential assessment of farm land, 42 states have responded by passing laws which granted preferential treatment to farm or other types of undeveloped land. Most of the remaining states have so-called classification laws, which allow modest preferential treatment of agricultural land, or are currently considering differential assessment legislation," (p. 5). Use-value assessment is either explicit or implied in all these state programs.

The concerns over distributive consequences take on various forms, e.g., how are impacts of the tax savings benefits distributed among different income groups, counties, and regions; is there a shifting of these tax benefits to different producer and consumer classes and if so what is the incidence pattern; are these tax benefits being capitalized into land values and to what extent; and what are the transfer effects of the foregone taxes on other tax bases?[2] In the analyses of these problems, an essential first step is usually to measure the actual amount of tax savings or foregone taxes.

An approach found in the recent literature is to compute the gross tax savings from the product of prevailing nominal tax rates and valuation differentials and to adjust this gross tax savings for additional income taxes that would have had to be paid to arrive at the net tax savings benefit.[3] This approach, however, is not based on effective tax rates and also does not take into account the cumulative growth effects of foregone tax bases over time. Since assessment ratios are typically less than 1.0, and both nominal tax rates and tax bases tend to change, this approach presents a problem in computing distributional effects over time.

Also in the early stages of a use-value program, total foregone taxes are relatively small compared to the total taxes that would have been collected without the tax. Then the expedient method for measuring the foregone taxes is to ignore the cumulative growth effects of the previous use-value reductions and simply to take the current annual difference in taxes with versus without the program. As the program matures and the tax benefits increase, questions arise as to the total cumulative benefits that have accrued to farmers and landowners over time. Public concern heightens when these agricultural tax benefits increase and tax pressures in other sectors press beyond threshold limits. When this happens, inappropriate measurements can conceivably lead to public misunderstanding and attempts to weaken rather than strengthen the use-value program.

This paper draws on the experience of Hawaii to advance appropriate methods for measuring the foregone taxes and the relative distributional impacts of its agricultural use-value program. The methods are general and can be applied, with modifications if necessary, to similar use-value programs elsewhere.

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[2]See for instance, Gustafson and Wallace, 1975; Pasour, 1973, 1975; Deaton and Mundy, 1975; Bevins, 1975; Schwartz, Hansen, and Foin, 1975; and Hansen and Schwartz, 1977. The net result of capitalization is to moderate the transfer effects as a consequence of both increasing farm property values and decreasing nonfarm property values.

[3]The recent distributional studies of California's Williamson Act by Schwartz, 1976, and Hansen, 1977, use this approach.

MEASURING FOREGONE TAXES

The problem of measuring the foregone taxes is essentially one of simulating the growth in the tax base as if without the program. The approach is to start with the tax base for the first year of the program and then to add back each successive year's reduction in valuations compounded by appropriate growth rates.

Thus, beginning with year 1 of the program, the tax base as if without the program would have grown as follows:

$$
\begin{aligned}
\text{Year 1} \quad & V_{0,1} = V_{w,1} + \Delta v_1 \qquad \ldots (1)\\
2 \quad & V_{0,2} = V_{w,2} + (\Delta v_1)\,\rho_2 + \Delta v_2\\
3 \quad & V_{0,3} = V_{w,3} + (\Delta v_1 \rho_2 + \Delta v_2)\,\rho_3 + \Delta v_3\\
4 \quad & V_{0,4} = V_{w,4} + (\Delta v_1 \rho_2 \rho_3 + \Delta v_2 \rho_3 + \Delta v_3)\,\rho_4 + \Delta v_4\\
& \vdots \qquad\qquad \vdots\\
T \quad & V_{0,T} = V_{w,T} + (\Delta v_1 \rho_2 \rho_3 \ldots \rho_{T-1} + \Delta v_2 \rho_3 \rho_4 \ldots \rho_{T-1} + \Delta v_{T-1})\,\rho_T + \Delta v_T
\end{aligned}
$$

where,

$V_{0,t}$ = tax base in year t as if without the program

$V_{w,t}$ = tax base in year t with the program

Δv_t = annual reduction in nominal tax base in year t due to the program—i.e., difference between market value and use-value of all lands in the program in year t, excluding foregone growth effects

ρ_t = growth rate for year t, i.e., the rate at which the previous reductions in valuations would have grown to in year t if the program had not existed. An expedient measure of ρ_t is to compute $(V_{w,t} - V_{w,t-1}) \div V_{w,t-1}$ of all agricultural lands in the property tax base.

The computational complexities of series 1 are with the second terms on the right hand side of each equation. These second terms simulate how the annual reductions in assessed valuations would have grown as if without the program. In this formulation, the annual growth rates can vary from year to year. These terms within the parentheses only can be re-expressed as follows:

$$
C_{t-1} = \begin{cases} \Delta v_1, & \text{for } t = 2 \\ \sum_{i=1}^{t-2} \Delta v_i \left(\prod_{j=i+1}^{t-1} \rho_j \right) + \Delta v_{t-1}, & \text{for } t > 2 \end{cases} \qquad \ldots (2)
$$

(variable growth rates factor).

For the first year of the program, $t = 1$, the expression evaluates to zero since there is no previous foregone tax base to consider,

i.e., $C_0 = \Delta v_0 = 0$.

Series 1 can then be more simply represented in the following generalized form:

$$V_{0,t} = V_{w,t} + C_{t-1}\rho_t + \Delta v_t \qquad \ldots (3)$$

(tax base in year t as if without the program).

From this, it is a simple matter to take the difference between the without and with tax bases to find the foregone tax base.

$$\Delta B_t = V_{0,t} - V_{w,t} = C_{t-1}\rho_t + \Delta v_t \qquad \ldots (4)$$

(foregone agricultural tax base in year t).

The foregone agricultural tax revenue for any year t, (ΔR_t), can then be computed by applying the relevant nominal agricultural tax rate $r_{a,t}$.

$$\Delta R_t = (C_{t-1}\rho_t + \Delta v_t)\, r_{a,t} \qquad \ldots (5)$$

(foregone agricultural tax revenues).

This in essence is the tax savings to the benefiting agricultural sector. The relative impacts on total taxes and on total tax base as if without the program are the same since the nominal tax rate cancels out in the following formula.

$$\%\Delta R_t = \frac{(C_{t-1}\rho_t + \Delta v_t)\, r_{a,t} \times 100}{(V_{w,t} + C_{t-1}\rho_t + \Delta v_t)\, r_{a,t}} = \%\Delta V_t. \qquad \ldots (6)$$

We need not, therefore, take explicit account of the nominal tax rates. Effective tax rates are, however, a different matter.

MEASURING DISTRIBUTIONAL IMPACTS

To determine the distributional impacts over time, the objective is to measure the relative differences in the effective tax rates with versus without the program and to compare these differences among urban and rural taxing jurisdictions. These effective tax rates are given by:

$$r_{w,t} = \frac{TR_t}{TB_t} \qquad r_{0,t} = \frac{TR_t}{TB_t + \Delta B_t} \qquad \ldots (7)$$

(with use-value program) (without use-value program)

where,

r = effective tax rate
subscripts w,t = with program in year t
$0,t$ = without program in year t

TR_t = total property tax revenues required by local taxing jurisdiction in year t

TB_t = total actual property tax base of taxing jurisdiction with the use-value program in year t

ΔB_t = cumulative foregone agricultural land tax base due to the use-value program in year t *(including growth effects) from equation 4.*

Total revenues are determined by local government budgetary requirements and are the same in either case since budgetary processes are, by and large, independent of the use-value program. The only difference comes from the annual foregone agricultural land tax base, which not only accumulates but also grows over time as shown earlier. The relative difference in effective tax rates is then given by:

$$\left(\frac{r_{w,t}}{r_{0,t}} - 1\right) = \frac{\Delta B_t}{TB_t} \qquad \ldots (8)$$

Equation 8, then, essentially measures the relative increase in the effective tax rate that has to be burdened by the total property tax base. It reflects both the relative foregone tax impact and transfer effects of the use-value program.

These effects will vary from rural to urban counties and also with changes in their respective economic structures over time. Since in rural counties the proportion of agricultural lands in the total property tax base is larger than in urban counties, the effect of the use-value program should be felt stronger in the rural counties. Over time, the cumulative increase and growth effects of the foregone tax base, ΔB_t, also should be felt stronger in the rural counties as compared to the urban counties. But the effect of urbanization or relative decline of agriculture in rural counties should tend to lessen the distributional impacts and subsequent transfer effects.

APPLICATIONS TO HAWAII

Since 1963, Hawaii has had, in effect, an agricultural land dedication and use-value program as part of its overall land use policy to preserve agricultural lands. The Hawaii State Department of Taxation, Property Technical Office, in its annual summary reviews of the program, typically computed the absolute level of taxes foregone for each year. Also, from time to time, to provide an idea of the relative impact of the program on the agricultural tax base, ratios were computed of assessed valuations of dedicated lands before use-value reduction to the total agricultural land tax base. This at least gave the appearance of being on the safe side of avoiding possible underestimations of the erosional effects of the program.

The results of these computations were of little consequence. As Table 1 shows, for most years the figures fell below 1 percent and only occasionally rose as high as 3 and 4 percent. Also, there was little to distinguish between the one SMSA County of Honolulu and the other three rural counties of Maui, Hawaii, and Kauai.

Table 1. Proportion of the Net Agricultural Land Tax Base Entering into the Dedication and Use-Value Program in Hawaii, 1963–1973

Year	State	SMSA County of Honolulu	Rural Counties		
			Maui	Hawaii	Kauai
1963	2.55	4.04	.42	.90	9.19
1964	.22	.36	.19	0	.13
1965	.49	.09	.09	0	3.53
1966	.96	2.14	.33	.10	1.57
1967	1.04	.98	.24	.24	.69
1968	.46	.60	.87	.15	.15
1969	.39	.36	.54	.09	1.03
1970	.37	.17	.54	.22	1.19
1971	.34	.42	.26	.36	.23
1972	1.01	.25	.66	.58	.20
1973	.61	.71	.38	.40	2.25

Ratio: $\frac{\text{Assessed valuation of dedicated lands before use-value reductions}}{\text{Total net agricultural land tax base after use-value reduction}} \times 100$

Source: Annual summary reports in the State Agricultural Dedication Program, State of Hawaii, Department of Taxation, Property Technical Office.

Neither one of these measures took into account the cumulative growth effects of the foregone tax bases. Up to 1973, the response to the program was mainly by relatively small and random diversified farmers with little overall impact on the tax base.

In 1973, major legislative changes were enacted (through Hawaii State Act 175) into the program resulting in significant impacts on the agricultural tax base. Whereas under the previous rules, use values applied only to voluntary dedications on a 10-year continuing basis, under Act 175 all lands in the Hawaii State Agricultural District, whether dedicated or not, benefit from use-value assessments as long as the lands are used for agricultural purposes. Also, extended dedications on 20-year continuing basis benefit from half of use-value assessments (i.e., these extended dedications enjoy twice as much in tax benefits as before because the taxable valuations are at 50 percent of use value).

These new tax benefits to agriculture were not without stronger roll-back and penalty provisions to safeguard against abuses of the program. Penalties were doubled from 5 to 10 percent of roll-back taxes, but of greater significance was the adoption of new assessment practices by the Department of Taxation for setting the shadow fair market values. Whereas traditionally highest and best use-values in agriculture were in most cases not too different from use-values under the Department's new assessment procedures, the shadow fair market values increased several-fold (some more than 10 times) over the traditional highest and best use-values.

These institutional changes have raised new concerns to decision-makers at all levels, particularly with regard to the distributional consequences of the use valuations program. The expedient methods of the Hawaii State Property Technical Office that perhaps served well enough for the earlier years when the impact of the foregone taxes was minor are no longer adequate and in fact have been abandoned.

EMPIRICAL RESULTS, 1963–1973

In Figure 1, the pattern of time trends in the agricultural land tax base as a percent of total property tax base for each county reflects the changing economic structure of the State. As expected, the highly urbanized City and County of Honolulu (the only SMSA), does not rely as heavily on agricultural lands in its property tax base as do the other three rural counties. There is about a 10-fold order of magnitude difference in tax base structures between SMSA and rural counties in Hawaii. The gradual declining trends reflect relative changes in the tax base structures away from agriculture. Only the County of Hawaii has maintained a constant balance at around 30 percent.

In Figure 2, the time trends in foregone agricultural land base as a percent of total property tax base reflect the distributional impacts of the use-value program. Again, as expected, these distributional impacts are more strongly felt in the rural counties than in the SMSA county, Honolulu. While they have increased over time, the relative levels have remained small (around 1 percent and less). These distributional impacts are not simple tax transfer effects from agriculture to nonagriculture. In order to meet the county budgetary needs, the foregone taxes must be made up from the remaining property tax base. This remaining property tax base is not only urban property but also agricultural property, which includes some lands that are not enrolled as well as other lands that are enrolled in the use-value program. Thus the distributional impacts are on agricultural as well as nonagricultural property.

The relations between changing economic structure and distributional impacts are shown in Figure 3. The effect of urbanization in moderating the increase in distributional impacts over time is evident in all cases. For the Honolulu SMSA, where the agricultural land tax base is relatively small and has steadily diminished from around 5 percent to around 1 percent, the distributional impacts have remained very minor. The foregone taxes of the use-value program were easily made up from a larger remaining tax base. For the rural counties with much larger agricultural bases, the distributional impacts tend to increase quite rapidly as long as the balance in the tax base structure remains constant (e.g., Hawaii County). However, as soon as this fiscal balance begins to shift away from agriculture, this increase levels off as in the cases of Maui County (which even tends to decline) and Kauai County, where the agricultural bases have steadily been cut back to about half of their earlier shares (i.e., from about 25 percent down to 12 percent).

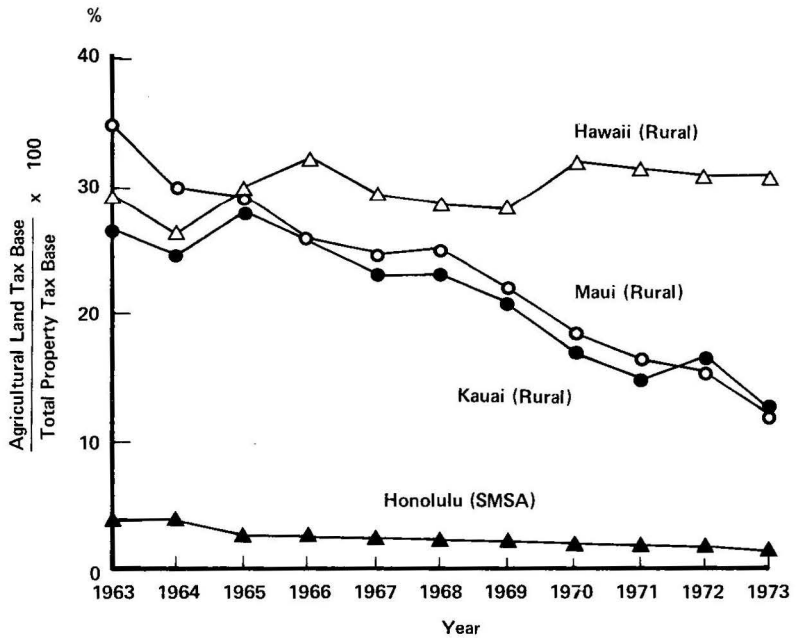

Figure 1. Time trends—agricultural land tax base as a percentage of total property tax base.

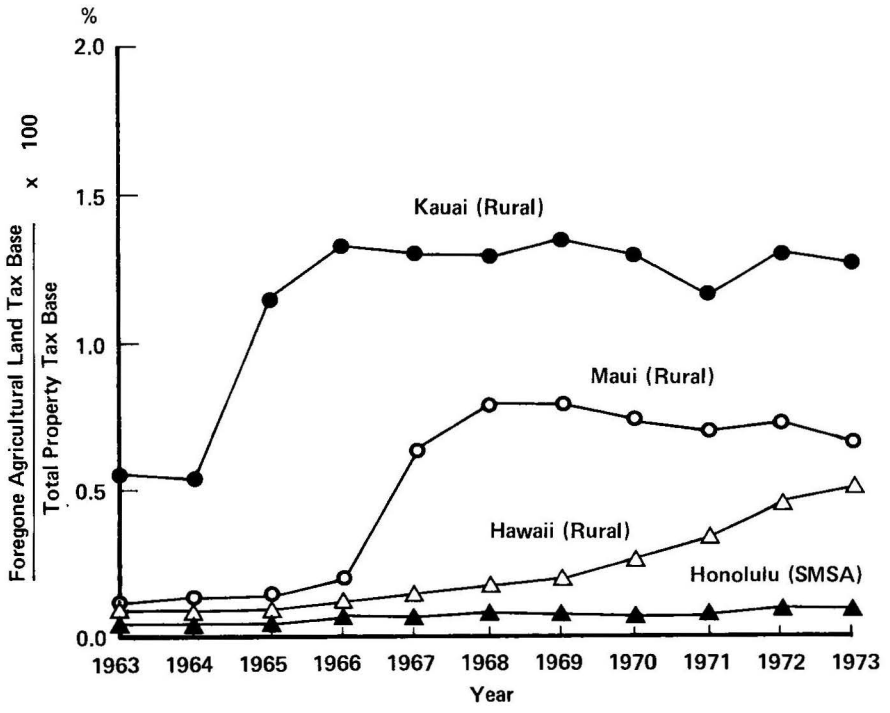

Figure 2. Time trends—foregone agricultural land tax base as a percentage of total property tax base.

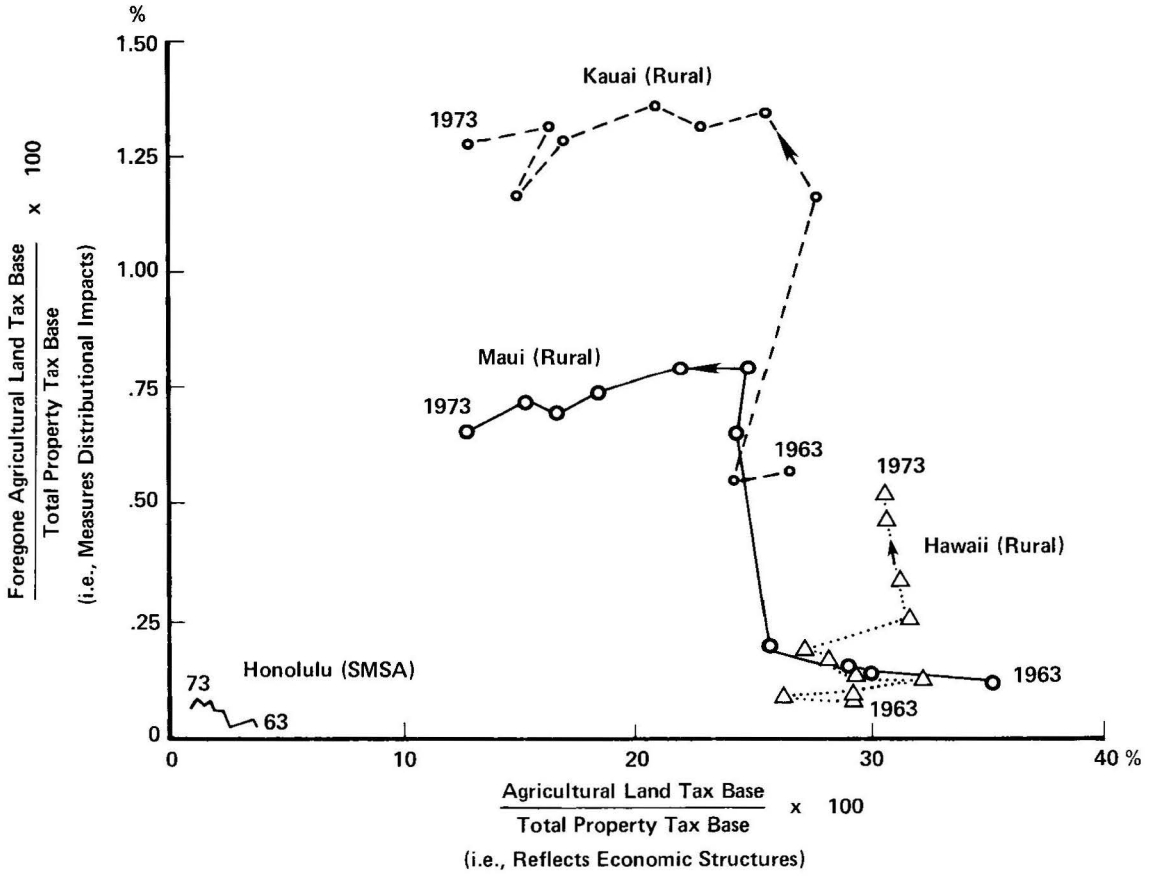

Figure 3. Relations between changing economic structures and distributional impacts over time.

FORMULAS FOR 1974 AND BEYOND

When Act 175 was passed by the Hawaii State Legislature in 1973, an entirely new phase was ushered into the State's agricultural use-value program. The traditional 10-year voluntary dedication program was completely revamped into the dual structured automatic deferred tax and extended dedication program described earlier. This recent revamping of the program poses some problems for empirical analysis, particularly with regard to the new administrative policy of setting shadow fair market values at much higher levels to reflect speculative sale prices.

Prior to the use-value program, fair market value was the only base for computing taxes. Revenue requirements and administrative equity were the primary considerations in establishing this property tax base. Even after the original 10-year voluntary dedication program was instituted, the traditional practices for setting fair market values were carried over into the use-value program. As it turned out, the value differentials were for the most part small. This helped in the smooth transition into the use-value program but had little consequence in affecting land use decisions.

Today, the role of the shadow fair market values in influencing land use decisions is potentially large. The wide differentials in values can lead to substantial amounts of deferred taxes and penalties for recapturing. More care must, therefore, be exercised in accounting for these recapture taxes in private decisions to convert land use out of agriculture.

These recent changes not only introduce some difficulties in data interpretation but also raise the question of whether or not sufficient time has elapsed to stabilize the new phase of the program so that meaningful empirical analysis can be conducted. Reassessment cycles run on the average of about three years and the accumulation of data reflects a transitional stage at best. Despite these difficulties in completing an empirical analysis at this time, the formulas for computing the distributional impacts of Act 175 in the agricultural district can be derived.

The total change in assessed value over time is given by:

$$\Delta B^{T}_{i,t} = \Delta B^{10}_{i,t} + \Delta B^{20}_{i,t} + \Delta B^{ND}_{i,t} \qquad \ldots (9)$$

where,

ΔB = change in assessed valuations taking into account foregone growth effects of reduced tax bases.

Subscripts– T = total
10 = 10-year dedications
20 = 20-year dedications
ND = nondedicated.

Subscripts– i = tax district (1 = Honolulu,
2 = Maui,
3 = Hawaii,
4 = Kauai)
t = year (1974,1975,1976, . . .).

ΔB^{ND} is unknown and can be computed for each county i and year t as follows:

$$\Delta B^{ND} = (HBUV^{ND} - AUV^{ND}) \qquad \ldots (10)$$
$$= [HBUV^{T} - (HBUV^{10} + HBUV^{20})] - [ALB^{T} - (AUV^{10} + AUV^{20})]$$

where,

$HBUV$ = highest and best use-value
AUV = agricultural use-value
ALB = agricultural land base (assessors net taxable valuations of agricultural lands).
Subscripts– T = total
10 = 10-year dedications
20 = 20-year dedications
ND = nondedicated

Distributional impacts are then given by the following formulas:

i) Total impact: ...(11)

$$\frac{\Delta B^T}{\text{total tax base}} = \text{combined dedication and deferred tax programs.}$$

ii) Impact of dedication program:

$$\frac{\Delta B^{10} + \Delta B^{20}}{\text{total tax base}} = \text{combined 10- and 20-year dedications}$$

$$\frac{\Delta B^{10}}{\text{total tax base}} = \text{10-year dedications}$$

$$\frac{\Delta B^{20}}{\text{total tax base}} = \text{20-year dedications.}$$

iii) Impact of deferred tax program:

$$\frac{\Delta B^{dt}}{\text{total tax base}} = \text{deferred tax program.}$$

CONCLUSIONS

In measuring the distributional impacts over time of foregone taxes–i.e., tax savings benefits to farmers–it is only necessary to compare effective tax rates with versus without the use-value program. Simulation can be used to measure the cumulative foregone effects (including growth effects) on the property tax base.

To analyze the behavior of these distributional impacts over time, it is useful to compare the results of SMSA versus rural taxing jurisdictions. Not only is the impact relatively minor for the SMSA, but the urbanization process tends to lessen whatever cumulative erosional effects on the tax base there might be because of the use-value program. Further, the incidence of transfer effects is not exclusively from agriculture to nonagriculture. In fact, agriculture shares in the burden of tax transfer effects, and this is more pronounced in the rural than SMSA areas.

It is possible to predict to some extent the distributional impacts of such expansion programs as Hawaii's. The impacts will be felt greater on the three rural counties of Maui, Hawaii, and Kauai than in the SMSA City and County of Honolulu. The effects of tourism and urbanization will tend to moderate these distributional impacts over time in all counties.

The potential for realizing more of the land allocative function of the program lies in policies that affect recapture taxes rather than use-value assessments per se. Such policies involve the widening of the shadow fair market value–use-value differentials and increasing the retroactive penalties. The greatest opportunities for such policies are in areas where prime agricultural lands are threatened by development.[4]

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[4]This last point is in direct contradiction to a conclusion in a 1976 national study for the President's Council on Environmental Quality, which states, "Rollback requirements, even with substantial interest payments, are not likely to be effective deterrents to development. This is particularly so in areas where development demands are strong and land values are increasing rapidly," (*Untaxing Open Space*, 1976, *see* particularly p. 117).

BIBLIOGRAPHY

1. Bevins, Robert J. "Real Property Taxes and Farm Real Estate Values: Incidence and Implications: Comment." *American Journal of Agricultural Economics*, 57 (1975): 725.
2. Deaton, Brady J., and S. Darrell Mundy. "Real Property Taxes and Farm Real Estate Values: Incidence and Implications: Comment." *American Journal of Agricultural Economics*, 57 (1975):125–26.
3. Gustafson, Gregory C., and L. T. Wallace. "Differential Assessment as Land Use Policy: The California Case." *American Institute of Planners Journal*, 41 (1975):379–89.
4. Hansen, David E., and S. I. Schwartz. "Income Distributional Effects of the California Land Conservation Act." *American Journal of Agricultural Economics*, 59 (1977):294–301.
5. Hawaii Agricultural Dedication Program. Annual Summary Reports. State of Hawaii Department of Taxation, Property Technical Office.
6. Pasour, E. C., Jr. "Real Property Taxes and Farm Real Estate Values: Incidence and Implications." *American Journal of Agricultural Economics*, 55 (1973):549–556.
7. _____. "The Capitalization of Real Property Taxes Levied on Farm Real Estate." *American Journal of Agricultural Economics*, 57 (1975):539–548.
8. Schwartz, S. I., David E. Hansen, and T. C. Foin. "Land Owner Benefits from Use-Value Assessment Under the California Land Conservation Act." *American Journal of Agricultural Economics*, 58 (1976):170–178.
9. United States Council of Environmental Quality. *Untaxing Open Space: An Evaluation of the Effectiveness of Differential Assessment of Farms and Open Space*, April 1976, 401 pp.

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